Taboo Interference into NTSC (1 of 3)

ATTC Test #	Description	Desired Power	Sub Test	Desired to Undesired Ratio (dB)				
				Best Result 1st Round		**Zenith (8VSB) Bakeoff Value Measured by ATTC**	**ACATS Target Value**	**Grand Alliance Value Measured by ATTC**
20	N-8 Ch. UHF Taboo ATV/NTSC	S	TOV	<-4.76	4	NITP		<-3.9
			CCIR4	NITP		NITP		NT
20	N-8 Ch. UHF Taboo ATV/NTSC	M	TOV	-19.01	2	NITP		-16.11
			CCIR4	NITP		<-23.30		<-23.95
20	N-8 Ch. UHF Taboo ATV/NTSC	W	TOV	-34.42	1	-30.95	<-25.5	-31.62
			CCIR3	NITP		NITP		-41.87
248	N-3 Ch. UHF Taboo ATV/NTSC	S	TOV	NITP		NITP		<-1.95
			CCIR4	NITP		NITP		NT
248	N-3 Ch. UHF Taboo ATV/NTSC	M	TOV	-20.30	1	NITP		-18.28
			CCIR4	NITP		NITP		<-21.95
248	N-3 Ch. UHF Taboo ATV/NTSC	W	TOV	-32.21	1	NITP		-29.73
			CCIR3	NITP		NITP		-36.81
28	N-2 Ch. UHF Taboo ATV/NTSC	S	TOV	<-2.94	2	NITP		<-1.62
			CCIR4	NITP		NITP		NT
28	N-2 Ch. UHF Taboo ATV/NTSC	M	TOV	<-15.5	1	NITP		-15.00
			CCIR4	NITP		-20.44		-21.62
28	N-2 Ch. UHF Taboo ATV/NTSC	W	TOV	-24.54	1	-24.12	<-23.5	-23.73
			CCIR3	NITP		-29.87		-30.87

Taboo Interference into NTSC (2 of 3)

ATTC Test #	Description	Desired Power	Sub Test	Desired to Undesired Ratio (dB)				
				Best Result 1st Round		**Zenith (8VSB) Bakeoff Value Measured by ATTC**	**ACATS Target Value**	**Grand Alliance Value Measured by ATTC**
32	N+2 Ch. UHF Taboo ATV/NTSC	S	TOV	<-1.47	2	NITP		<-0.57
			CCIR4	NITP		NITP		NT
32	N+2 Ch. UHF Taboo ATV/NTSC	M	TOV	<-20.12	4	NITP		-17.46
			CCIR4	NITP		NITP		<-20.38
32	N+2 Ch. UHF Taboo ATV/NTSC	W	TOV	-30.25	1	-29.23	<-28.5	-27.93
			CCIR3	NITP		-35.33		-37.07
249	N+3 Ch. UHF Taboo ATV/NTSC	S	TOV	NITP		NITP		<-3.39
			CCIR4	NITP		NITP		NT
249	N+3 Ch. UHF Taboo ATV/NTSC	M	TOV	-23.40	1	NITP		-19.79
			CCIR4	NITP		NITP		<-22.71
249	N+3 Ch. UHF Taboo ATV/NTSC	W	TOV	-38.62	1	NITP		-34.13
			CCIR3	NITP		NITP		-42.21
36	N+4 Ch. UHF Taboo ATV/NTSC	S	TOV	<-6.19	4	NITP		<-4.8
			CCIR4	NITP		NITP		NT
36	N+4 Ch. UHF Taboo ATV/NTSC	M	TOV	-21.07	1	NITP		-18.21
			CCIR4	NITP		-23.98		<-24.13
36	N+4 Ch. UHF Taboo ATV/NTSC	W	TOV	-27.49	1	-23.75	<-22.5	-24.96
			CCIR3	NITP		-28.74		-30.96

Taboo Interference into NTSC (3 of 3)

ATTC Test #	Description	Desired Power	Sub Test	Desired to Undesired Ratio (dB)				
				Best Result 1st Round		Zenith (8VSB) Bakeoff Value Measured by ATTC	ACATS Target Value	Grand Alliance Value Measured by ATTC
44	N+8 Ch. UHF Taboo ATV/NTSC	S	TOV	<3.21	4	NITP		<-5.11
			CCIR4	NITP		NITP		NT
44	N+8 Ch. UHF Taboo ATV/NTSC	M	TOV	<-23.24	4	NITP		<-25.05
			CCIR4	NITP		NITP		NT
44	N+8 Ch. UHF Taboo ATV/NTSC	W	TOV	<-43.24	4	<-39.77	<-36.5	-43.22
			CCIR3	NITP		NITP		<-45.05
48	N+14 Ch. UHF Taboo ATV/NTSC	S	TOV	<-4.48	4	NITP		<-2.83
			CCIR4	NITP		NITP		NT
48	N+14 Ch. UHF Taboo ATV/NTSC	M	TOV	-23.30	4	NITP		-22.24
			CCIR4	NITP		NITP		<-22.91
48	N+14 Ch. UHF Taboo ATV/NTSC	W	TOV	-27.18	1	-27.88		-29.55
			CCIR3	NITP		-38.91	<-32.5	-33.38
52	N+15 Ch. UHF Taboo ATV/NTSC	S	TOV	<-3.62	4	NITP		<-1.15
			CCIR4	NITP		NITP		NT
52	N+15 Ch. UHF Taboo ATV/NTSC	M	TOV	-15.74	2	NITP		-14.53
			CCIR4	NITP		NITP		-21.20
52	N+15 Ch. UHF Taboo ATV/NTSC	W	TOV	-17.97	4	-15.88		-17.58
			CCIR3	NITP		-28.88	<-22.5	-30.58

Taboo Interference into ATV (1 of 2)

ATTC Test #	Description	Desired Power	Sub Test	Desired to Undesired Ratio (dB)				
				Best Result 1st Round		Zenith (8VSB) Bakeoff Value Measured by ATTC	ACATS Target Value	Grand Alliance Value Measured by ATTC
259	N-3 Ch. UHF Taboo NTSC/ATV	S	TOV*	NITP		NITP		<-22.07
259	N-3 Ch. UHF Taboo NTSC/ATV	M	TOV*	NITP		NITP		<-47.06
259	N-3 Ch. UHF Taboo NTSC/ATV	W	TOV*	NITP		NITP	<-53	<-61.79
260	N-3 Ch. UHF Taboo ATV/ATV	S	TOV*	NITP		NITP		<-20.95
260	N-3 Ch. UHF Taboo ATV/ATV	M	TOV*	NITP		NITP		<-45.98
260	N-3 Ch. UHF Taboo ATV/ATV	W	TOV*	NITP		NITP	<-53	<-60.61
29	N-2 Ch. UHF Taboo NTSC/ATV	S	TOV	-33.97	1	NITP		NITP
			TOV*	NITP		NITP		<-23.19
29	N-2 Ch. UHF Taboo NTSC/ATV	M	TOV	<-43.00	2	NITP		NITP
			TOV*	NITP		NITP		<-48.23
29	N-2 Ch. UHF Taboo NTSC/ATV	W	TOV	-58.22	4	NITP		NITP
			TOV*	NITP		NITP	<-53	-62.45
30	N-2 Ch. UHF Taboo ATV/ATV	S	TOV	<-32.07	2	NITP		NITP
			TOV*	NITP		NITP		<-21.83
30	N-2 Ch. UHF Taboo ATV/ATV	M	TOV	<-47.04	2	NITP		NITP
			TOV*	NITP		NITP		<-46.8
30	N-2 Ch. UHF Taboo ATV/ATV	W	TOV	-58.87	2	NITP		NITP
			TOV*	NITP		NITP	<-53	-60.52

* BER Method

Taboo Interference into ATV (2 of 2)

ATTC Test #	Description	Desired Power	Sub Test	Desired to Undesired Ratio (dB)				
				Best Result 1st Round		Zenith (8VSB) Bakeoff Value Measured by ATTC	ACATS Target Value	Grand Alliance Value Measured by ATTC
33	N+2 Ch. UHF Taboo NTSC/ATV	S	TOV	<-33	2	NITP		NITP
			TOV*	NITP		NITP		<-23.88
33	N+2 Ch. UHF Taboo NTSC/ATV	M	TOV	<-43	2	NITP		NITP
			TOV*	NITP		NITP		<-48.87
33	N+2 Ch. UHF Taboo NTSC/ATV	W	TOV	<-58	2	NITP		NITP
			TOV*	NITP		NITP	<-53	-59.86
34	N+2 Ch. UHF Taboo ATV/ATV	S	TOV	<-32.95	4	NITP		NITP
			TOV*	NITP		NITP		<-22.35
34	N+2 Ch. UHF Taboo ATV/ATV	M	TOV	<47.37	2	NITP		NITP
			TOV*	NITP		NITP		<-47.33
34	N+2 Ch. UHF Taboo ATV/ATV	W	TOV	-56.10	2	NITP		NITP
			TOV*	NITP		NITP	<-53	-59.13
261	N+3 Ch. UHF Taboo NTSC/ATV	S	TOV*	NITP		NITP		<-23.1
261	N+3 Ch. UHF Taboo NTSC/ATV	M	TOV*	NITP		NITP		<-48.08
261	N+3 Ch. UHF Taboo NTSC/ATV	W	TOV*	NITP		NITP	<-53	<-62.49
262	N+3 Ch. UHF Taboo ATV/ATV	S	TOV*	NITP		NITP		<-21.99
262	N+3 Ch. UHF Taboo ATV/ATV	M	TOV*	NITP		NITP		<-46.98
262	N+3 Ch. UHF Taboo ATV/ATV	W	TOV*	NITP		NITP	<-53	<-61.53

* BER Method

Multipath Impairment into ATV
Random Noise in the Presence of Ensembles of 5 Multipaths

ATTC Test #	Description	Desired Power	Sub Test	Desired to Undesired Ratio (dB)			
				Best Result 1st Round	Zenith (8VSB) Bakeoff Value Measured by ATTC ◊	ACATS Target Value †	Grand Alliance Value Measured by ATTC
281	Random Noise into ATV & Multipath Calibration	S	TOV*	NITP			15.16
272	Random Noise into ATV & Multipath Ensemble A	S	ΔTOV*	NITP	2.50	<3.5	3.28
273	Random Noise into ATV & Multipath Ensemble B	S	ΔTOV*	NITP	2.25	<3.5	2.40
274	Random Noise into ATV & Multipath Ensemble C	S	ΔTOV*	NITP	2.50	<3.5	3.18
275	Random Noise into ATV & Multipath Ensemble D	S	ΔTOV*	NITP	2.00	<3.5	2.89
276	Random Noise into ATV & Multipath Ensemble E	S	ΔTOV*	NITP	2.25	<3.5	3.64
277	Random Noise into ATV & Multipath Ensemble F	S	ΔTOV*	NITP	2.00	<3.5	1.20
278	Random Noise into ATV & Multipath Ensemble G	S	ΔTOV*	NITP	1.00	<3.5	1.68

* BER Method

† The ACATS Target Value for multipath ensembles was based upon the average of the 8-VSB Bakeoff Values.

◊ The sign of the ΔTOV has been reversed from the Transmission Subsystems Performance Test Results to be consistent with the "ensemble minus calibration" calculation method used for ACATS Target Values and Grand Alliance measured values.

Multipath Impairment into ATV
Co-Channel NTSC in presence of Ensembles of 5 Multipaths

ATTC Test #	Description	Desired Power	Sub Test	Desired to Undesired Ratio (dB)			
				Best Result 1st Round	**Zenith (8VSB) Bakeoff Value Measured by ATTC**	**ACATS Target Value**	**Grand Alliance Value Measured by ATTC**
280	Co-Channel NTSC/ATV & Multipath Calibration	W	TOV*	NITP	NITP		1.60
266	Co-Channel NTSC/ATV & Multipath Ensemble A	W	ΔTOV*	NITP	NITP		5.98
267	Co-Channel NTSC/ATV & Multipath Ensemble B	W	ΔTOV*	NITP	NITP		5.76
268	Co-Channel NTSC/ATV & Multipath Ensemble C	W	ΔTOV*	NITP	NITP		8.98
269	Co-Channel NTSC/ATV & Multipath Ensemble D	W	ΔTOV*	NITP	NITP		7.14
270	Co-Channel NTSC/ATV & Multipath Ensemble E	W	ΔTOV*	NITP	NITP		5.80
271	Co-Channel NTSC/ATV & Multipath Ensemble F	W	ΔTOV*	NITP	NITP		3.91

* BER Method

Multipath Impairment into ATV
Strongest Static Echo Rejection

ATTC Test #	Description	Desired Power	Sub Test	Desired to Undesired Ratio (dB)			
				Best Result 1st Round	Zenith (8VSB) Bakeoff Value Measured by ATTC	ACATS Target Value	Grand Alliance Value Measured by ATTC
284	Random Noise into ATV & Multipath Ensemble C w/o 18μS Echo	S	TOV*	NITP	16.44		16.99

ATTC Test #	Description	Desired Power	Sub Test	Main Path to Variable Path Ratio (dB)			
				Best Result 1st Round	Zenith (8VSB) Bakeoff Value Measured by ATTC	ACATS Target Value	Grand Alliance Value Measured by ATTC
285	Strongest Static Echo Rejection: 30μS in Modified Ensemble C	S	TOV*	NITP	16.70		17.10
286	Strongest Static Echo Rejection: 5.7μS in Ensemble A	S	TOV*	NITP	7.30		6.90
287	Strongest Static Echo Rejection: 15μS	S	TOV*	NITP	2.90		5.80
288	Strongest Static Echo Rejection: 5.7μS	S	TOV*	NITP	2.30		3.00
289	Strongest Static Echo Rejection: 1.0μS	S	TOV*	NITP	1.00		1.60

* BER Method

Multipath Impairment into ATV
Strongest Dynamic Echo Rejection

ATTC Test #	Description	Desired Power	Sub Test	Main Path to Variable Path Ratio (dB)				
				Best Result 1st Round		**Zenith (8VSB) Bakeoff Value Measured by ATTC**	**ACATS Target Value**	**Grand Alliance Value Measured by ATTC**
290	Strongest Dynamic Echo Rejection: 1.8μS in Ensemble A (0 Hz)	S	TOV	NITP		NITP		5.40
			TOV*	NITP		5.20		4.20
291	Strongest Dynamic Echo Rejection: 1.8μS in Ensemble A (0.05 Hz)	S	TOV	NITP		NITP		8.00 †
			TOV*	NITP		7.50		7.60
292	Strongest Dynamic Echo Rejection: 1.8μS in Ensemble A (0.50 Hz)	S	TOV	NITP		NITP		9.00
			TOV*	NITP		10.80		9.10
293	Strongest Dynamic Echo Rejection: 1.8μS in Ensemble A (5 Hz)	S	TOV	NITP		NITP		12.70
			TOV*	NITP		19.50		12.50
294	Strongest Dynamic Echo Rejection: 1.0μS @ 2Hz	S	TOV	9.36	4	NITP		
			TOV*	NITP		10.00		4.40
295	Strongest Dynamic Echo Rejection: 1.0μS @ 5 Hz	S	TOV	10.10	1	NITP		
			TOV*	NITP		12.00		6.20

* BER Method

† The TOV was acquisition limited.

Discrete Frequency Interference into ATV

ATTC Test #	Frequency (MHz)	Desired Power	Sub Test	Desired to Undesired Ratio (dB)				
				Best Result 1st Round		Zenith (8VSB) Bakeoff Value Measured by ATTC	ACATS Target Value	Grand Alliance Value Measured by ATTC
102	201.0125	W	TOV*	-47.97	2	NITP	<-39.5	-52.02
103	201.5125	W	TOV*	-47.34	2	NITP	<-39.5	-51.59
104	202.0125	W	TOV*	-45.33	2	NITP	<-39.5	-50.34
105	202.5125	W	TOV*	-44.73	2	NITP	<-39.5	-49.89
106	203.0125	W	TOV*	-42.43	2	NITP	<-39.5	-47.44
107	203.5125	W	TOV*	-41.09	2	NITP	<-39.5	-45.09
108	204.0125	W	TOV*	-7.04	4	NITP		-20.05
109	204.5125	W	TOV*	5.31	4	NITP	<12.75	10.70
110	205.0125	W	TOV*	5.95	4	NITP	<12.75	10.30
111	205.5125	W	TOV*	7.48	4	NITP	<12.75	10.61
112	206.0125	W	TOV*	6.79	4	NITP	<12.75	10.16
113	206.5125	W	TOV*	6.86	4	NITP	<12.75	11.73
114	207.0125	W	TOV*	6.76	4	NITP	<12.75	13.11
115	207.5125	W	TOV*	6.40	4	NITP	<12.75	10.76
116	208.0125	W	TOV*	6.96	4	NITP	<12.75	9.52
117	208.5125	W	TOV*	8.17	4	NITP	<12.75	9.08
118	209.0125	W	TOV*	7.13	4	NITP	<12.75	9.06
119	209.5125	W	TOV*	6.24	4	NITP	<12.75	10.03
120	210.0125	W	TOV*	-12.97	2	NITP		-16.46
121	210.5125	W	TOV*	-44.05	2	NITP	<-39.5	-47.42
122	211.0125	W	TOV*	-45.09	2	NITP	<-39.5	-48.16
123	211.5125	W	TOV*	-45.57	2	NITP	<-39.5	-50.86
232	212.0125	W	TOV*	-46.60	2	NITP	<-39.5	-50.33
233	212.5125	W	TOV*	-47.50	2	NITP	<-39.5	-51.08
234	213.0125	W	TOV*	-47.45	2	NITP	<-39.5	-51.32

* BER Method

Threshold Characteristics of ATV

ATTC Test #	Description	Desired Power	Sub Test	Desired to Undesired Ratio (dB)				
				Best Result 1st Round		**Zenith (8VSB) Bakeoff Value Measured by ATTC**	**ACATS Target Value**	**Grand Alliance Value Measured by ATTC**
58	Random Noise into ATV (Video)	S	TOV	15.38	4	14.91	<15.6	15.28
			POU	14.72	2	NITP		14.41
			POR	NITP		NITP		14.41
			POF	NITP		NITP		14.41
			TOV*	NITP		NITP	<15.6	15.19
241	Random Noise into ATV (Audio)	S	TOA	NITP		NITP	<15.6	14.92
			POU	NITP		NITP		14.54
			POR	NITP		NITP		
			POF	NITP		NITP		14.54

* BER Method

Degradation of BTSC Audio

ATTC Test #	Description	Desired Power	Sub Test	Desired to Undesired Ratio (dB)			
				Best Result 1st Round	**Zenith (8VSB) Bakeoff Value Measured by ATTC**	**ACATS Target Value**	**Grand Alliance Value Measured by ATTC**
3	Upper Adjacent ATV/NTSC	S	Video CCIR3	NITP	<-0.91	<-12.5	-12.50*
			Audio CCIR3	NITP	NITP		-13.99
			Audio CCIR4	NITP	NITP		-11.74
			SAP CCIR4	NITP	NITP		-10.74
3	Upper Adjacent ATV/NTSC	M	Video CCIR3	NITP	NITP		-13.03*
			Audio CCIR3	NITP	NITP		-14.07
			Audio CCIR4	NITP	NITP		-10.82
			SAP CCIR4	NITP	NITP		-5.57
3	Upper Adjacent ATV/NTSC	W	Video CCIR3	NITP	-16.17	<-12.5	-16.91*
			Audio CCIR3	NITP	NITP		-11.95
10	Lower Adjacent ATV/NTSC	W	Video CCIR3	NITP	-17.95	<-14.5	-15.96
			Audio CCIR3	NITP	NITP		†
			SAP CCIR3	NITP	NITP		†
48	N+14 Ch. UHF Taboo ATV/NTSC	W	Video CCIR3	NITP	-38.91	<-32.5	-33.38
			Audio CCIR3	NITP	NITP		<-33.38
			SAP CCIR3	NITP	NITP		<-33.38

* "Voted" CCIR3 level is shown, rather than the higher D/U level corresponding to the color beat (see Section I-4.3).

† Median CCIR3 not found for Audio and SAP, which were shown to be less sensitive than video on 6 receivers tested.

Resolution - 1080I

Description	RPM	ACATS Target Value	Grand Alliance Value Measured by ATTC
Static Resolution, Luma, H/V/D, 1080x1920	0.0	430/350/550 C/APH	460/400/540 C/APH
Static Resolution, Chroma R-Y, H/V/D, 1080x1920	0.0	215/175/275 C/APH	250/140/260 C/APH
Static Resolution, Chroma B-Y, H/V/D, 1080x1920	0.0	215/175/275 C/APH	250/140/260 C/APH
Dynamic Resolution, Camera, Luma, H/V/D, 1080x1920	0.0	345/195/395 C/APH	500/360/540 C/APH†
Dynamic Resolution, Camera, Luma, H/V/D, 1080x1920	0.5	345/195/395 C/APH	500/360/540 C/APH†
Dynamic Resolution, Camera, Luma, H/V/D, 1080x1920	1.5	345/195/395 C/APH	500/360/540 C/APH†
Dynamic Resolution, Camera, Luma, H/V/D, 1080x1920	5.0	345/195/395 C/APH	500/200/540 C/APH†
Dynamic Resolution, Camera, Chroma R-Y, H/V/D, 1080x1920	0.0	170/140/220 C/APH	258/129/160 C/APH†
Dynamic Resolution, Camera, Chroma B-Y, H/V/D, 1080x1920	0.0	170/140/220 C/APH	260/135/160 C/APH†
Dynamic Resolution, Camera, Chroma R-Y, H/V/D, 1080x1920	0.5	170/140/220 C/APH	258/129/160 C/APH†
Dynamic Resolution, Camera, Chroma B-Y, H/V/D, 1080x1920	0.5	170/140/220 C/APH	260/135/160 C/APH†
Dynamic Resolution, Camera, Chroma R-Y, H/V/D, 1080x1920	1.5	170/140/220 C/APH	240/129/160 C/APH†
Dynamic Resolution, Camera, Chroma B-Y, H/V/D, 1080x1920	1.5	170/140/220 C/APH	240/129/160 C/APH†
Dynamic Resolution, Camera, Chroma R-Y, H/V/D, 1080x1920	5.0	170/95/195 C/APH	135/100/135 C/APH†
Dynamic Resolution, Camera, Chroma B-Y, H/V/D, 1080x1920	5.0	170/140/220 C/APH	135/100/135 C/APH†

Note: Static resolution measurements used a circular zone plate pattern in which spatial frequencies increased equally in all directions from the center outward. Dynamic resolution measurements on the Grand Alliance system used an electronically generated radial resolution pattern in which spatial frequencies increased from the periphery inward toward the center. The first round dynamic resolution procedure used a camera-imaged radial resolution pattern.

Resolution - 720P

Description	RPM	ACATS Target Value	Grand Alliance Value Measured by ATTC
Static Resolution, Luma, H/V/D, 720x1280	0.0	290/325/435 C/APH	320/275/400 C/APH
Static Resolution, Chroma R-Y, H/V/D, 720x1280	0.0	145/160/215 C/APH	180/180/230 C/APH
Static Resolution, Chroma B-Y, H/V/D, 720x1280	0.0	145/160/215 C/APH	180/180/230 C/APH
Dynamic Resolution, Camera, Luma, H/V/D, 720x1280	0.0	230/260/345 C/APH	300/270/360 C/APH†
Dynamic Resolution, Camera, Luma, H/V/D, 720x1280	0.5	230/260/345 C/APH	300/270/360 C/APH†
Dynamic Resolution, Camera, Luma, H/V/D, 720x1280	1.5	230/260/345 C/APH	300/240/360 C/APH†
Dynamic Resolution, Camera, Luma, H/V/D, 720x1280	5.0	230/260/345 C/APH	300/210/360 C/APH†
Dynamic Resolution, Camera, Chroma R-Y, H/V/D, 720x1280	0.0	115/130/170 C/APH	175/175/200 C/APH†
Dynamic Resolution, Camera, Chroma B-Y, H/V/D, 720x1280	0.0	115/130/170 C/APH	175/175/200 C/APH†
Dynamic Resolution, Camera, Chroma R-Y, H/V/D, 720x1280	0.5	115/130/170 C/APH	175/175/200 C/APH†
Dynamic Resolution, Camera, Chroma B-Y, H/V/D, 720x1280	0.5	115/130/170 C/APH	175/175/200 C/APH†
Dynamic Resolution, Camera, Chroma R-Y, H/V/D, 720x1280	1.5	115/130/170 C/APH	170/170/200 C/APH†
Dynamic Resolution, Camera, Chroma B-Y, H/V/D, 720x1280	1.5	115/130/170 C/APH	170/170/200 C/APH†
Dynamic Resolution, Camera, Chroma R-Y, H/V/D, 720x1280	5.0	115/130/170 C/APH	170/160/183 C/APH†
Dynamic Resolution, Camera, Chroma B-Y, H/V/D, 720x1280	5.0	115/130/170 C/APH	170/160/183 C/APH†

Note: Static resolution measurements used a circular zone plate pattern in which spatial frequencies increased equally in all directions from the center outward. Dynamic resolution measurements on the Grand Alliance system used an electronically generated radial resolution pattern in which spatial frequencies increased from the periphery inward toward the center. The first round dynamic resolution procedure used a camera-imaged radial resolution pattern.

Latency

Description	ACATS Target Value	Grand Alliance Value Measured by ATTC *
Video-Audio Latency (1080-lines)	< 15 msec	+9 to +13 msec
Video-Captioning Latency (1080-lines)	< 100 msec	-17 to -33 msec
Video-Audio Latency (720-lines)	< 15 msec	-36 to -40 msec
Video-Captioning Latency (720-lines)	< 100 msec	- 1 msec

* (+) video is leading and (-) video is lagging

Peak-to-Average Power

METHOD	Cumulative Distribution Funtion	Peak-to-Average Power Ratio (dB)			
		Best Result 1st Round (DigiCipher)	**Zenith (8VSB) Bakeoff Value Measured by ATTC**	**ACATS Target Value**	**Grand Alliance Value Measured by ATTC**
Generic	99.9%	5.5	6.20	<6.95	5.9 †
	99.99%	6.2	6.95		6.6 †
	99.999%	6.8	7.47		7.1 †
Boonton	99.9%	N/A	6.24	<6.95	6.17
	99.99%	N/A	6.95		6.89
	99.999%	N/A	7.44		N/A

† determined by interpolation of data points taken

RADIO FREQUENCY MASK TESTS

At the request of the FCC Advisory Committee's PS/WP-3 (ATS Spectrum Utilization and Alternatives), through SS/WP-2 (System Evaluation and Testing), ATTC will undertake tests to provide data for the development of the digital advanced television (ATV) "RF Mask." This will aid the broadcast industry and the Federal Communications Commission in specifying limits of ATV emissions relative to adjacent channels.

The procedure for this test, sometimes referred to as the "sideband splatter" test, has been developed and approved by SS/WP-2 (attached). The test does not involve the use of the Grand Alliance system, and is not part of the tests for that system.

The tests are planned for September 12-19, 1995 and the results will be filed with the FCC Advisory Committee as soon as possible.

SSWP2-1463
25 July 95

ADVANCED TELEVISION TEST CENTER, INC.

1330 BRADDOCK PLACE SUITE 200 ALEXANDRIA, VIRGINIA 22314-1650
703/739-3850 FAX 703/739-3230

July 25, 1995

Mr. Mark Richer
SS/WP-2 Chairman, FCC Advisory
Committee on Advanced Television Service
c/o Public Broadcasting Service
1320 Braddock Place
Alexandria, Virginia 22314

Dear Mark:

Enclosed is a test procedure to devise an RF mask for ATV emissions, for review at your meeting tomorrow. This procedure was drafted by Charlie Rhodes and reviewed by Carl Eilers and Rich Citta of Zenith and by Bob Bromery of the FCC. The test has been approved previously, in principle, by SS/WP-2. It appears in the Grand Alliance test matrix ("Index of Tasks for Individual Tests") as the test for "Sideband Splatter from ATV transmitter into Adjacent Channels". However, inasmuch as it uses bandpass filtered random noise to simulate ATV, rather than an actual ATV transmitter, it is more properly termed an "RF Mask" test.

As we have noted in previous discussions of this test within SS/WP-2, it does not involve the Grand Alliance system hardware which, of course, has now left the Test Center. We plan to conduct the test in August, as soon as it can be implemented and dry run and expert viewers can be lined up.

Sincerely,

Tom

Thomas M. Gurley
Director of Testing

cc: Carl Eilers, Zenith/Grand Alliance
Richard Citta, Zenith/Grand Alliance
Robert Bromery, OET/FCC

Enclosure

ATTC
7/25/95

EXPERIMENTAL PROCEDURE TO DEVISE AN RF MASK FOR ATV EMISSIONS

PS/WP-3 has requested SS/WP-2 to devise a test procedure to determine the spectral noise power density as a function of frequency across an NTSC channel to provide the data upon which an RF mask can be designed which would be used to describe the out-of-channel emission limits for an ATV transmitter.

The experimental procedure is very similar to that used to measure the threshold of visible random noise into NTSC. In this case, the random noise is band limited and the band limited noise heterodyned to the test channel (channel 12) by means of a frequency synthesizer. The frequency of the synthesizer is varied during the experiment so that the narrow-band noise appears at different frequencies and observers establish the Threshold of Visibility (TOV) of the narrow-band noise at each frequency.

The experimental set-up is shown in Figure 1. The Gaussian noise from the Noisecom generator is filtered by means of a 60 MHz bandpass filter whose frequency response is shown in Figure 2. The filtered noise (centered at 60 MHz) is heterodyned to the test frequency by the synthesizer. As channel 12 extends from 204 to 210 MHz the lowest frequency is 144 MHz and the highest is 151 MHz (which extends the testing into the upper adjacent channel by 1 MHz). The frequency increments are 0.5 MHz.

To facilitate detecting the threshold U level, the interfering narrow-band noise is gated on-off, on-off, continuously, at a 1 Hz rate. The expert viewer(s) will note the TOV on each receiver and when this is found at a given frequency, the noise spectrum is shifted to the next of the 15 test frequencies.

The Desired NTSC level must be chosen experimentally to be above the noise level of the receivers, but it must not be so high that the available narrow band noise power is below TOV at or near the edge(s) of the test channel where NTSC receivers are relatively insensitive. Therefore, the maximum available U power will first be asserted to the receivers under test with the synthesizer frequency set to 144 MHz (lower limit of channel 12). The Desired signal level will be decreased from maximum available until all 24 receivers evidence visible interference. Then the U signal will be switched off, and the 24 receivers examined for visibility of noise. They should not show noise on a flat grey field of 50 IRE.

Since this test was first proposed by PS/WP-3, a need to extend this test to determine the noise floor near the aural carrier frequency of the NTSC signal has

been expressed. This frequency is 209.750 MHz in the test channel. Such testing should also employ noise occupying 0.5 MHz. There is a need to explore a range of frequencies from at least 0.250 MHz below the aural carrier of channel 12 to at least 1 MHz above this frequency into the upper adjacent channel. One test frequency must be centered 4.50 MHz above the visual carrier.

When this is done, it will be possible to construct plots of the relative video sensitivity to such noise as a function of frequency across an NTSC channel. Data for all 24 NTSC receivers being plotted as a scatter plot. Sensitivity to aural impairment of the 24 receivers will be plotted separately, with stereo, mono and SAP so indicated.

In addition, the threshold of visibility for random noise whose spectrum is substantially flat across the test channel will be measured and reported for each receiver.

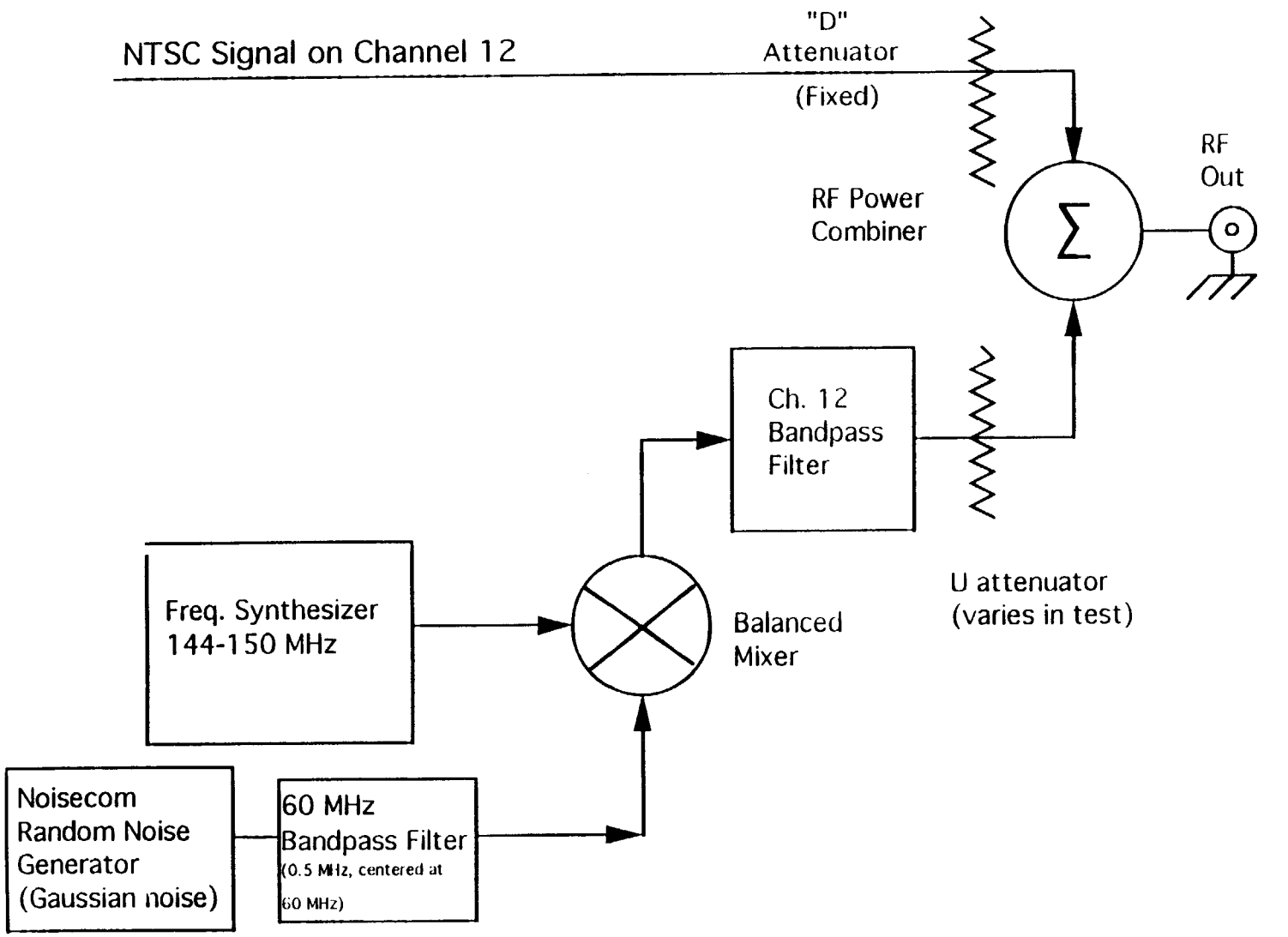

Figure 1: Test Setup for RF Test Bed

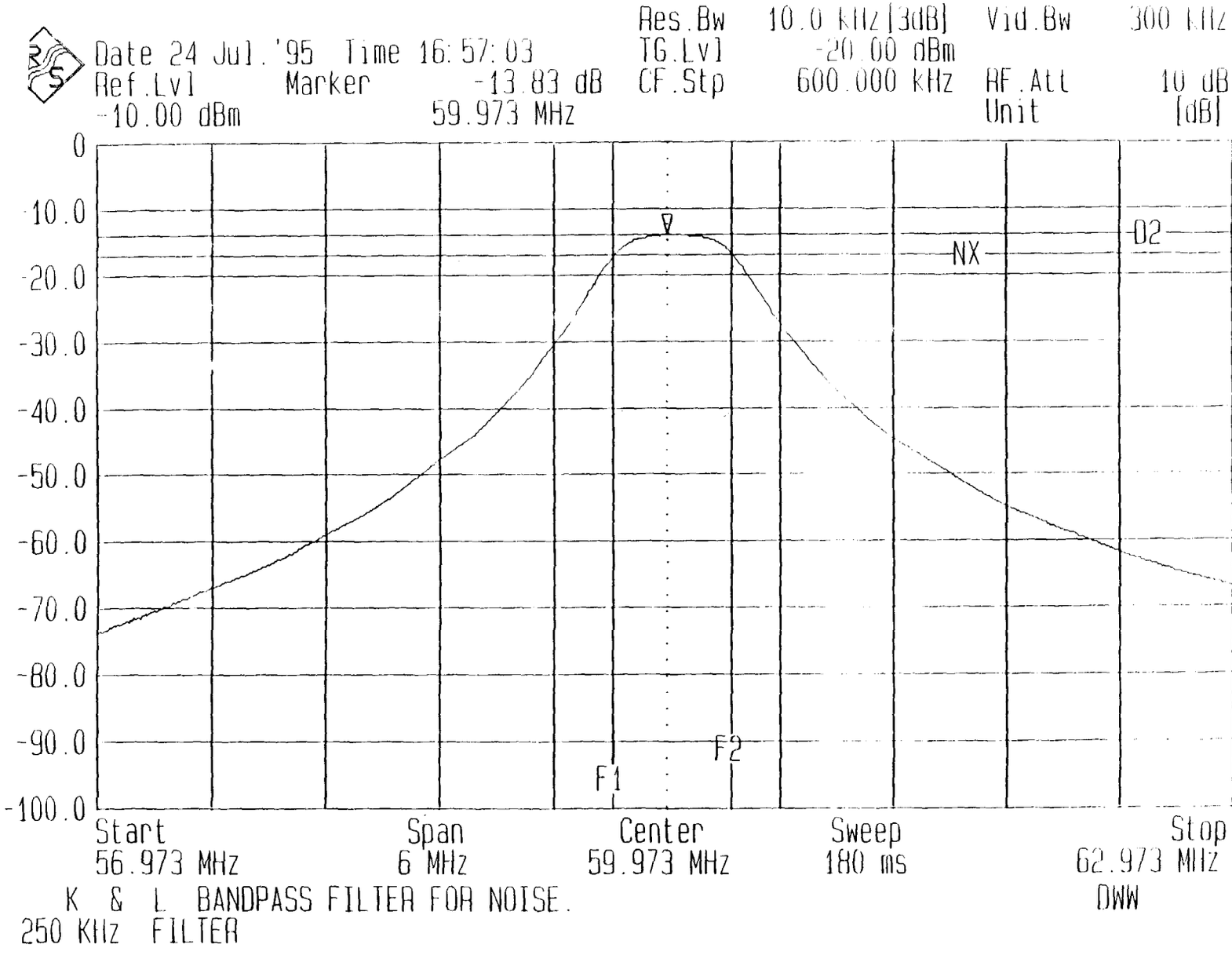

Figure 2: Noise Bandpass Filter for RF Mask Experiment at ATTC

Part II

Record of Test Results

for

digital HDTV
Grand Alliance System

from Tests Conducted by

Expert Observers of the SS/WP-2
Task Force on Digital-Specific Tests
(April - July, 1995)

Task Force Observers:

John G. N. Henderson, Chairman
Hitachi America, Ltd.
Robert M. Bromery
Federal Communications Commission
George A. Hanover
Electronic Industries Association
William H. Inglis
Federal Communications Commission
William Y. Zou
Public Broadcasting Service

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Section 1.

SUMMARY OF THE RESULTS

The tests and observations of the Task Force on Digital Specific Tests emphasized video performance, although some aspects of transmission were also studied.

The observers found that the video quality of the ***digital* HDTV Grand Alliance System** is clearly superior to that of any of the previous proponent systems. This statement applies to all types of video tested—still images, motion sequences, computer graphics, and film. This is not to say that compression artifacts (*e.g.*, quantization noise and blockiness) could never be found. We noted, rather, that the level of compression artifacts was significantly lower than for any previous systems and that visible artifacts occurred only on the most difficult images. We comment further that this round of tests added images that were not used in the earlier testing and that many of these new images were more challenging for digital compression than the images of earlier test rounds.

In particular, we noted that scene cut performance was much improved. We understand this to be the result of some specific compression algorithm improvements in the Grand Alliance system.

The image quality of the interlaced and progressive systems was quite comparable, unlike earlier testing. More detailed discussion of this point is found in the discussions of the relevant test results.

Several new tests are included in this report. In particular, we studied the trade-off between image quality and the use of some of the channel capacity (*i.e.*, some of the 19 Mbits/sec) for auxiliary data. We studied a variety of images, including the most difficult available, for the effects of devoting up to 4 Mbit/sec to auxiliary data. We found the performance of the system to depend on scene content. Most scenes showed little or no artifacts at the full video rate and little or no increase in artifacts as the auxiliary data rate was increased to 3 Mbit/sec. At the 4 Mbit/sec data rate, however, the more challenging of these scenes showed a clear increase in the visibility of artifacts. One very challenging scene exhibited slight artifacts at the full video rate. For this scene, performance visibly deteriorated as the auxiliary data rate was increased. We conclude that use of some channel capacity for auxiliary data is clearly possible, but that care must be exercised if the video contains complex motion or other stressful material.

As expected, the threshold of visibility of transmission channel impairments is sharp. Audio does not fail before video. Essentially, they fail together, consistent with the sharp threshold.

Detailed observations that support this summary are recorded in the remaining sections of this report. The reader should also consult the document *Grand Alliance System Test Procedures* (SS/WP2-1306). That document describes the test procedures and rationale in more detail; the test titles and numbers in this report are the same as those used in the SS/WP2 document.